PHENIX Hadronic Calorimeter Tile Characterization and Testing

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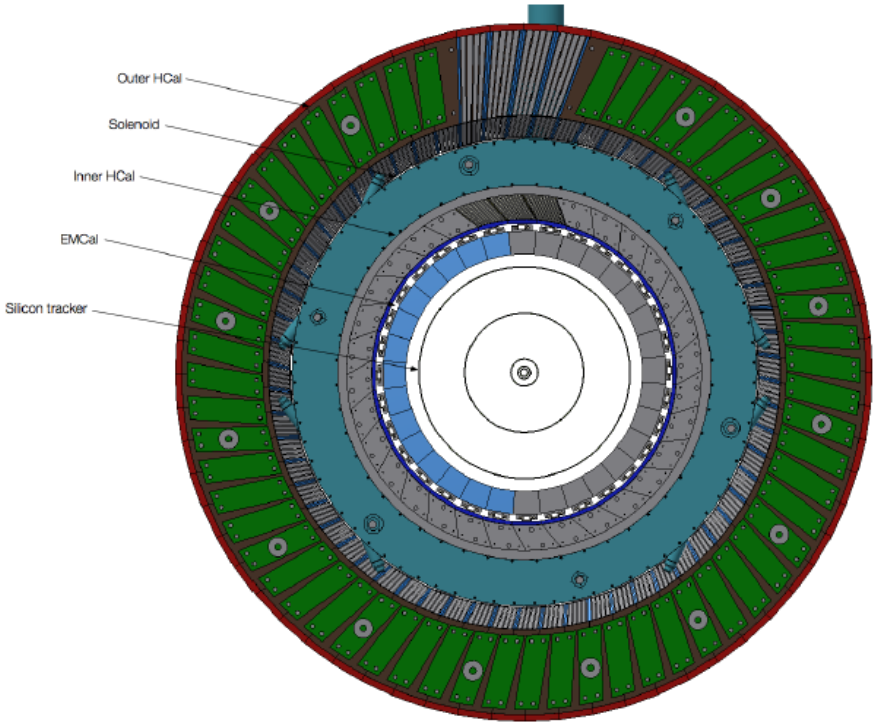

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Goals of Test Stand for Tile Characterization

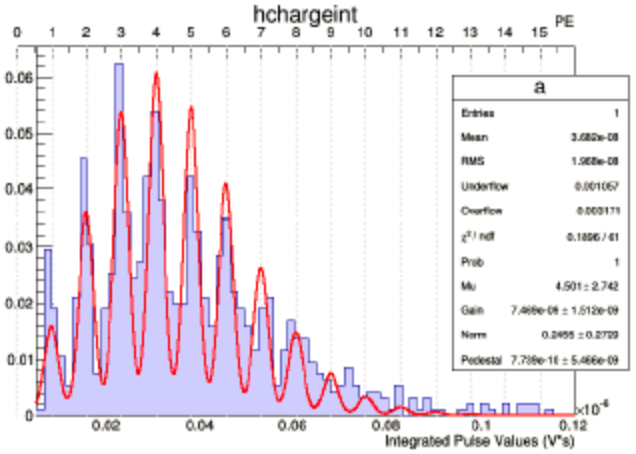
•Optimize light collection via wavelength shifting fiber pattern and reflective coating

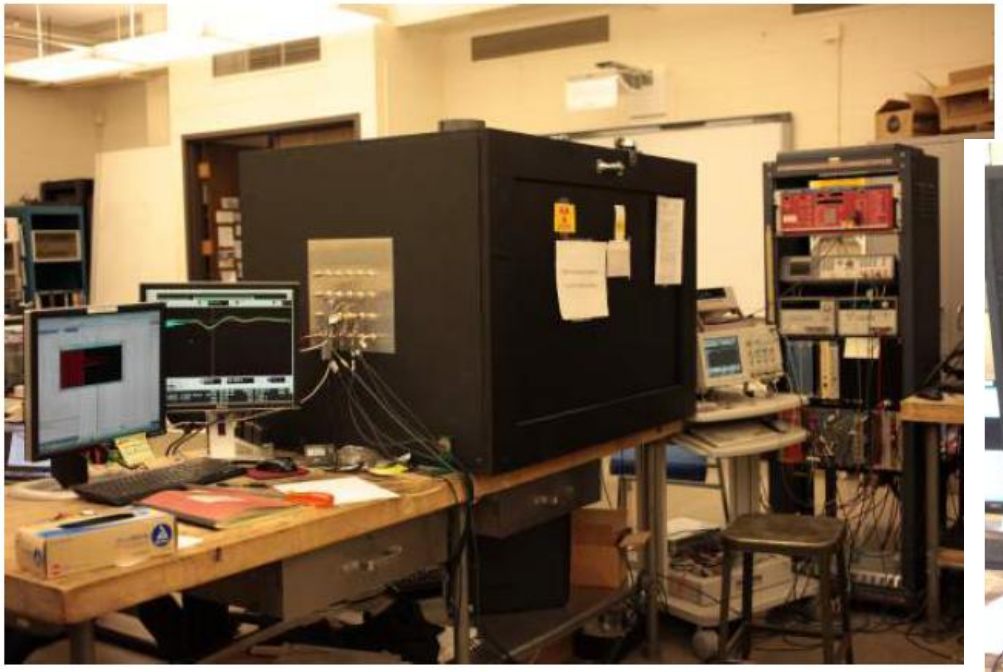
• Balancing of light response for:
  (1) relative distance to nearest fiber
  (2) change in sampling fraction as a function of depth

• QA testing of final production panels prior to installation in sPHENIX

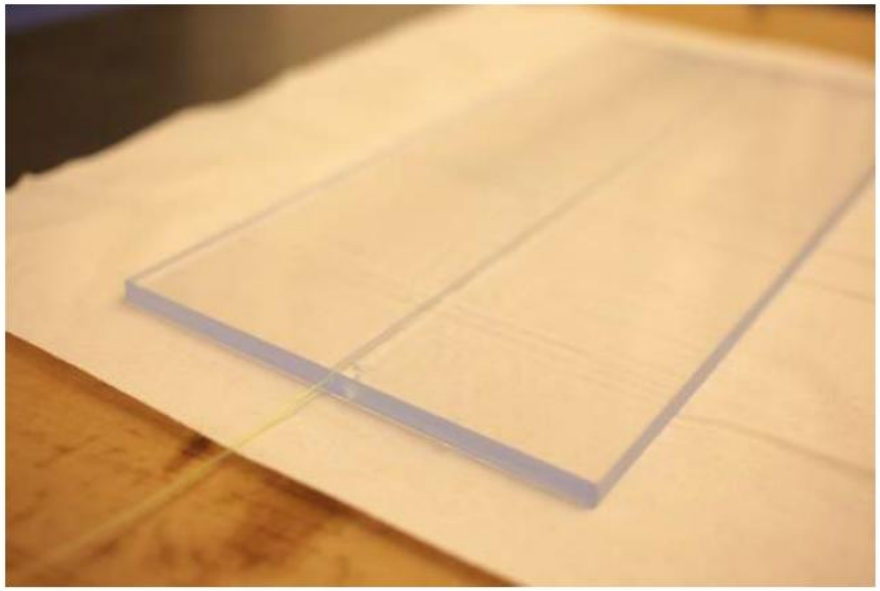
Test Stand at University of Colorado

- 2-D Stepper Motor with Computer Control
- 2 SiPM readout with BNL designed preamp
- 1 PMT trigger
- Sr-90 source and cosmic capabilities
- Fast DAQ with full waveform recorded





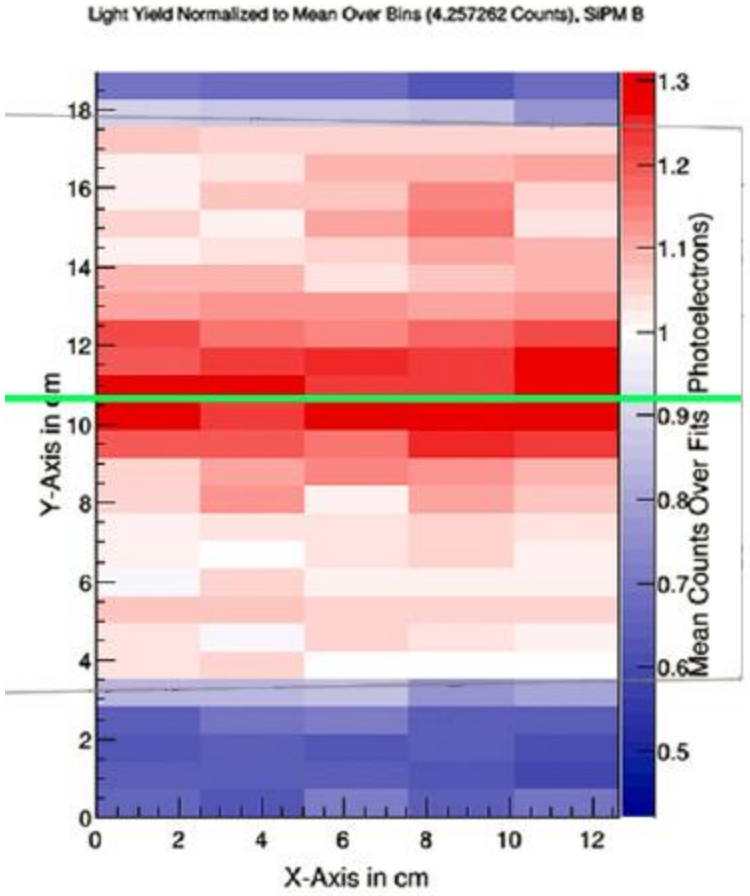
Test Configuration



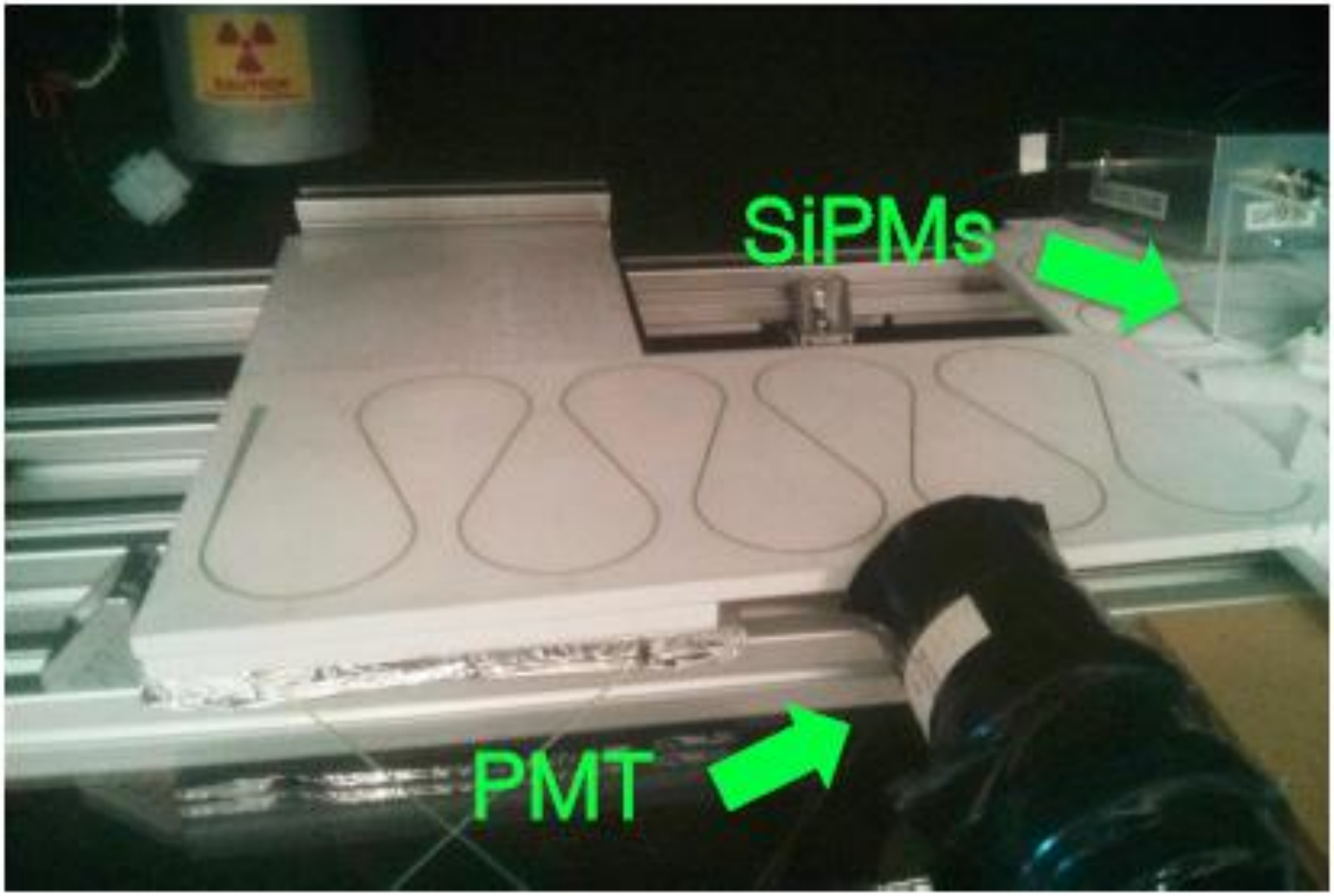
As a basic test, last summer we machined a single scintillator with a groove for one straight fiber.

Test results indicate 15% more light within 0.5 cm of fiber location.

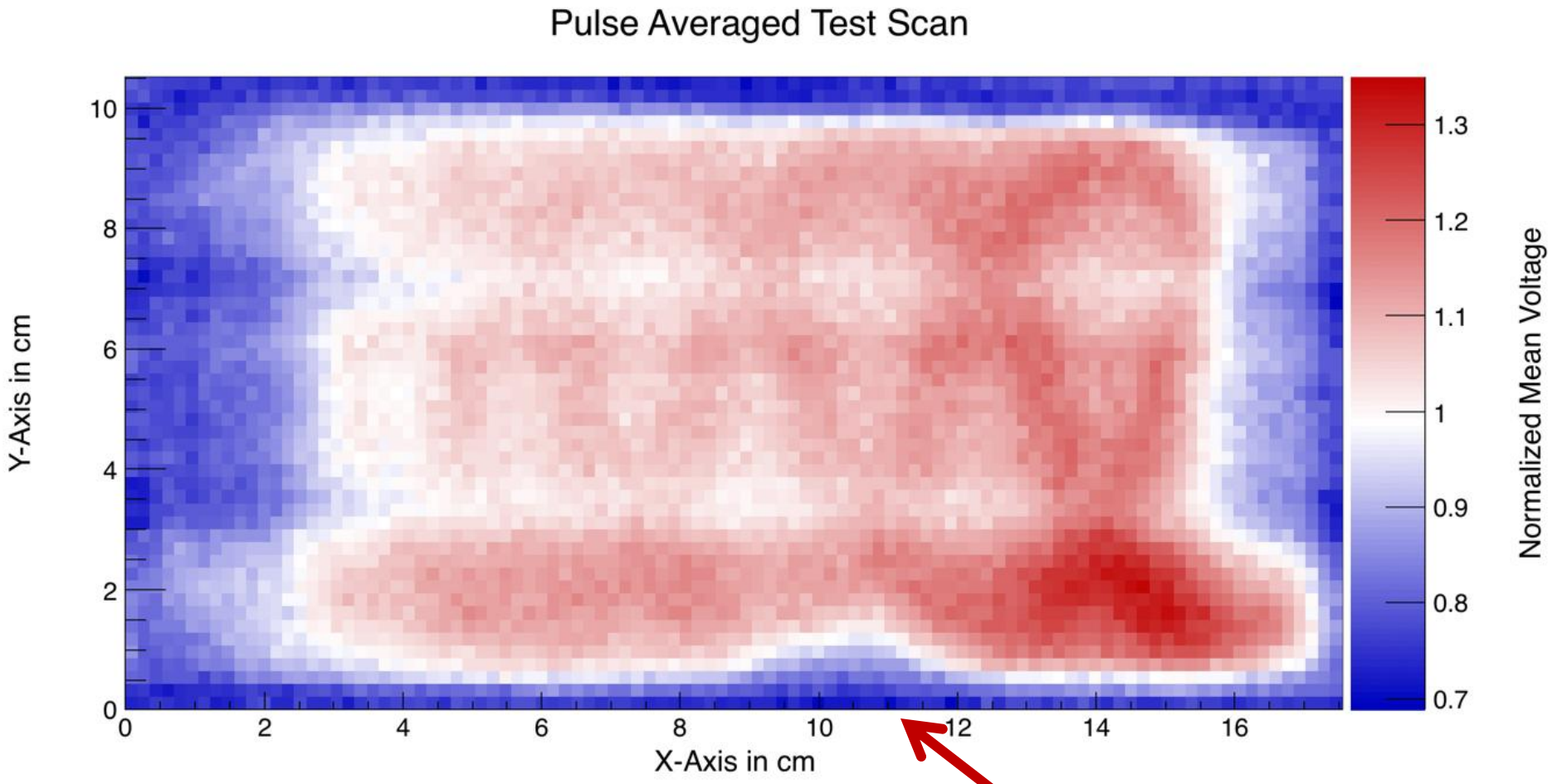
Note we had a relatively low light yield on the panels we have made ourselves.



Uniplast Manufactured Small Tile



Test Results



Similar 15% increase in light yield near fiber.
Much higher light yield with Uniplast tile.

Location of PMT trigger

Full Size Tile Test Stand

We are building a second test stand capable of testing full 1 meter long tiles. All parts on hand – expected completion in 2 weeks.

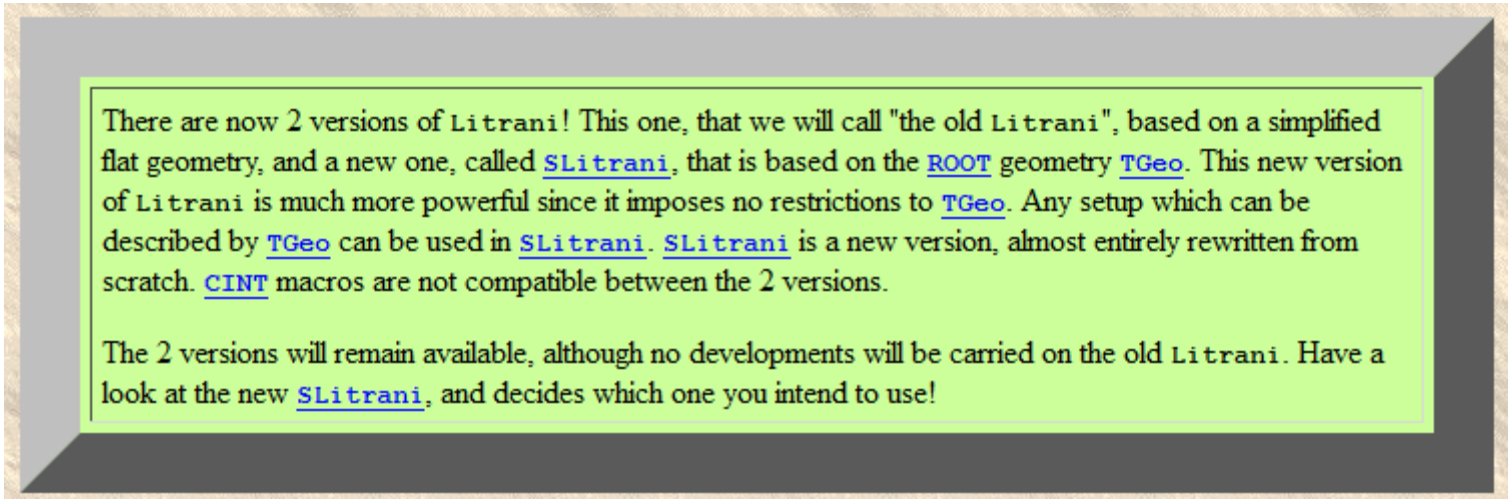
Second test stand to use in Boulder on next set of Uniplast tiles. Eventually this test stand will move to Brookhaven for full QA tests.

Simulation

We have been in contact with CMS and other groups that have used embedded wavelength shifting fibers.

We are using suggested software to compare with experimental tests. We note that all groups say that one must test all configurations – not best option to rely on simulation packages.

http://gentitfx.fr/litrani/



Summary

- Test setup already evaluating existing panels

- Full 1 meter setup ready in 2 weeks for testing next full size panels

- Different fiber and reflective coating pattern comparisons can be quickly compared

- Test stand capable of full QA testing either in Boulder or at Brookhaven